

a control circuit in the head end that assigns each service unit to a subband for transmission and receipt of data; and

the control circuit is further operable to allocate a payload channel to a service unit in response to a request for a service unit.

3. (New) The system of claim 2, wherein the control circuit is operable assign a number of service units to each subband for selective use of the payload channels in the subband by the service units so as to increase the number of service units that can be coupled to the system.

4. (New) The system of claim 2, wherein the transmission medium comprises a hybrid fiber-coax telecommunications system.

5. (New) The system of claim 2, wherein the head end comprises at least one modem circuit for each transmission channel.

6. (New) A method for maintaining the quality of transmission from a head end to a service unit in a telecommunications system that uses multi-carrier transmission scheme with dynamic bandwidth allocation, the method of comprising the steps of:

allocating a first payload channel to a service unit in a subband of a transmission channel of the telecommunications system;

monitoring the quality of the first payload channel; and

when the quality of the first payload channel drops below a threshold, allocating a second, different payload channel to the channel unit.

7. (New) The method of claim 6, and further comprising the step of deallocating the first payload channel after communication over the second payload channel is established.

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8. (New) The method claim 6, wherein the step of monitoring the quality of the first payload channel comprises the step of deriving a probable bit error rate for the first payload channel.

9. (New) The method of claim 8, wherein the step of deriving a probable bit error rate comprises the step of sampling a parity bit for the payload channel.

10. (New) The method of claim 6, wherein the step of allocating a second, different payload channel comprises the step of allocating a second payload channel in the same subband as the first payload channel.

11. (New) A method for dynamically allocating bandwidth to a service unit in a telecommunications system that uses a multi-carrier transmission scheme with transmission channels that include a number of subbands, each including a number of payload channels, comprising the steps of:

- receiving a request for a payload channel to provide a service unit that is assigned to a first subband;
- selecting an available payload channel in the first subband;
- determining if the payload channel is acceptable to provide the service to the service unit;
- when the payload channel is acceptable, allocating the payload channel to the service unit;
- when the payload channel is unacceptable, repeating the steps of selecting and determining to find an acceptable payload channel.

12. (New) The method of claim 11, wherein the step of selecting an available payload channel comprises the step of determining whether payload channels are available starting at approximately the middle of the transmission channel and examining the channels outwardly toward the edges of the transmission channel.

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13. (New) The method of claim 11, wherein the step of determining if the payload channel is acceptable comprises the step of assessing the history of the bit error rate for the available payload channel to determine the transmission quality for the payload channel.

14. (New) The method of claim 11, and further comprising steps of:
determining if sufficient payload channels are available in the subband assigned to the service unit; and
reassigning the service unit to a different subband when there are not sufficient payload channels available.

15. (New) The method of claim 11, wherein the step of selecting an available payload channel comprises determining limitations on payload channels that can be used by a service unit from the service unit.

16. (New) The method of claim 11, wherein the step of selecting an available payload channel comprising determining limitations of the service unit, the limitations stored on the service unit.

17. (New) A method for allocating payload channels for a service that uses multiple payload channels in a telecommunications system with a multi-carrier transmission scheme to communicate with a service unit, the method comprising the steps of:
assigning an identifier for each payload channel that indicates the relative order of the multiple payload channels for the service;
monitoring the quality of the multiple payload channels;
when the quality of one of the payload channels drops below a threshold,
allocating a different payload channel to replace the original payload channel for the service and; and
in the service unit, reordering the payload channels using the identifier for the original payload channel so that the proper order for the allocated payload channels is

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maintained by the service irrespective of the order that the payload channels are received at the service unit.

18. (New) The method of claim 17, wherein the identifier distinguishes between B1, B2, and D channels for an ISDN service.

19. (New) A method for allocating bandwidth in a telecommunications system that uses a multi-carrier transmission scheme with transmission channels that include a number of subbands, each subband including a number of payload channels, the method comprising:

selectively assigning service units to the subbands such that the service units of the telecommunications system are substantially evenly distributed over the number of subbands of the system; and

selectively allocating payload channels within a subband to service units assigned to the subband.

20. (New) The method of claim 19, wherein selectively assigning service units comprises assigning the service units based on at least one of a type of the service unit, a likely load on a control channel for the service unit, a number of available payload channels in a subband, and historical data on transmission quality over the payload channels of the subband.

21. (New) The method of claim 19, wherein selectively assigning service units comprises assigning subbands to service units beginning with subbands substantially at the middle of the available bandwidth.

22. (New) The method of claim 19, wherein selectively assigning service units comprises assigning one or more service units to a selected subband.

23. (New) The method of claim 19, wherein selectively assigning service units comprises assigning at least two service units of different types to a selected subband.

24. (New) The method of claim 19, wherein selectively allocating channels within a subband comprises:
- allocating a first payload channel to a service unit in a subband of a transmission channel of the telecommunications system;
 - monitoring the quality of the first payload channel; and
 - when the quality of the first payload channel drops below a threshold, allocating a second, different payload channel to the channel unit.
25. (New) The method of claim 24, and further comprising the step of deallocating the first payload channel after communication over the second payload channel is established.
26. (New) The method of claim 24, wherein the step of monitoring the quality of the first payload channel comprises the step of deriving a probable bit error rate for the first payload channel.
27. (New) The method of claim 26, wherein the step of deriving a probable bit error rate comprises the step of sampling a parity bit for the payload channel.
28. (New) The method of claim 24, wherein the step of allocating a second, different payload channel comprises the step of allocating a second payload channel in the same subband as the first payload channel.
29. (New) The method of claim 19, and further comprising selectively reassigning a service unit to another subband when sufficient channels are not available to handle a request from the service unit.
30. (New) A method for allocating bandwidth in a telecommunications system that uses a multi-carrier transmission scheme with transmission channels that include a number of subbands, each subband including a number of payload channels and at least one control channel, the method comprising:

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selectively assigning a first service unit to a subband located substantially at a center of the bandwidth; and

selectively assigning additional service units to the subbands such that the service units of the telecommunications system are substantially evenly distributed over the number of subbands of the system.

31. (New) The method of claim 30, and further including:

selectively allocating channels within a subband to service units assigned to the subband.

32. (New) The method of claim 30, wherein selectively assigning a first service unit and selectively assigning additional service units comprises assigning the service units based on at least one of a type of the service unit, a likely load on a control channel for the service unit, a number of available payload channels in a subband, and historical data on transmission quality over the payload channels of the subband.

33. (New) A telecommunications system comprising:

a head end that transmits data over a transmission medium to a number of service units, the head end comprising a modem circuit for transmission in at least one of a number of subbands of a transmission bandwidth, each subband having a number of payload channels and a control channel;

a control circuit in the head end that assigns each service unit to a subband such that the service units are substantially evenly distributed over the subbands; and

the control circuit is further operable to allocate a payload channel to a service unit in response to a request for bandwidth for a service unit.

34. (New) A method for allocating bandwidth in a telecommunications system that uses a multi-carrier transmission scheme with transmission channels that include a number of subbands, each subband including a number of payload channels, the method comprising:

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selectively assigning a first service unit to a subband located substantially at a center of the bandwidth; and

selectively assigning additional service units to the subbands such that the load of the service units of the telecommunications system is substantially evenly distributed over the number of subbands of the system.

35. (New) A method for allocating bandwidth in a telecommunications system that uses a multi-carrier transmission scheme with a number of subbands, each subband including a number of payload channels, the method comprising:

determining at least one characteristic of a service unit; and

selectively assigning the service unit to a subband based on the at least one characteristic such that the service units of the telecommunications system are substantially evenly distributed over the number of subbands of the system.

36. (New) The method of claim 35, wherein determining at least one characteristic of a service unit comprises determining at least one of a type of the service unit, a likely load on a control channel for the service unit, and a likely load of the service unit.

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